

THE WASPS OF THE GENUS PISONOPSIS FOX

(Hymenoptera: Sphecidae)

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The material studied consists of 93 specimens. Seven of these are from the collection of the United States National Museum and from that of Dr. Karl V. Krombein; 3 are from Dr. G. E. Bohart's collection; 37 from the California Insect Survey, Department of Entomology and Parasitology, University of California; 2 from Mr. P. H. Timberlake; 3 from the California Academy of Sciences; 1 from the American Museum of Natural History; 3 from P. W. Weber of Honolulu; and 37 are of my own collecting. Three species and two subspecies are represented, as follows:

Pisonopsis clypeata Fox. Nevada and California.

Pisonopsis clypeata occidentalis Williams, California.

Pisonopsis birkmanni Rohwer. Texas and California.

Pisonopsis triangularis Ashmead. Colorado, Wyoming, Idaho and California.

Pisonopsis triangularis californicus Williams, California.

The only other species of *Pisonopsis* that appear to be described are:

Pisonopsis anomala Mantero, 1901, *Bul. Soc. Ent. Ital.*, 33:202-203. From Argentina (Patagonia).

Pisonopsis argentinus Schrottky, 1909, *An. Soc. Cien, Argentina*, 68:249. From Argentina (Catamarca).

Thanks are due to the above institutions and entomologists for the loan of material, and particularly to Dr. Karl V. Krombein of the United States National Museum for comparing certain of the specimens.

Genus PISONOPSIS FOX

Pisonopsis Fox, 1893, *Psyche*, 6:553. Genotype, *Pisonopsis clypeata*, from Nevada.

Form stout; mandibles notched beneath, no malar space; eyes moderately emarginate within in female, rather weakly so in the male; interocular space at clypeus usually distinctly greater than at vertex; ocelli round; antennae placed immediately behind clypeus; prepectus present; marginal cell not appendiculate though terminating rather bluntly on costa, not or hardly extending beyond third submarginal cell; second submarginal cell rather short petiolate, usually receiving both recurrent veins; anal lobe of hind wings short, not at all reaching to opposite the apex of submedian cell; legs not strongly spinose; middle tarsi with one apical spur; tarsal claws entire, somewhat inflated basally beneath. Female with or without a margined

pygidial area, and without a tarsal comb. Tergites somewhat constricted apically.

This small American genus is somewhat related to *Pison*, which however, does not have the mandibles notched beneath, while the eyes are deeply notched within, the marginal cell is long and lanceolate and the stigma is longer.

There is a group of tropical American wasps somewhat intermediate between *Pisonopsis* and *Pison*, and of which I have taken two species representing oriental Ecuador, British Guiana and Brazil. Here the eyes are deeply emarginate and the marginal cell as long as in *Pison*, but the mandibles are strongly notched beneath as in *Pisonopsis*.

Little seems to be known about the life history of *Pisonopsis*.

Linsley *et al*¹ report (p. 274) finding four species of wasps of the family Larridae (two species of *Solierella* and two of *Pisonopsis*) appropriating the burrows of the *Diadasia* bee for their nests. These authors state: "One species in particular, *Pisonopsis clypeata* Fox, was very abundant, and females were commonly observed entering both old and new bee burrows. When the first 30 burrows constructed in the square yard area were dug out at the end of the active season, five were found to have larrid provisions in the entrance tube." . . . "The *Pisonopsis* does not alter the original dimensions but accumulates small pebbles and wood fragments to separate its several young." The nature of the prey of these *Pisonopsis* was not determined.

Early in the summer of 1952 the writer reared seven individuals of *Pisonopsis birkmanni* from two lots of cocoons found in small dead stems of poison hemlock (*Conium maculatum* L.) collected during the winter at Danville, Contra Costa County, California. The cells were separated chiefly by grains of soil, and the casks or cocoons much resemble those of *Solierella* save that those of *Pisonopsis* have a somewhat shining resinous appearance instead of being entirely granular, as in *Solierella*. The cask of *Pisonopsis* may be imperfectly enveloped in a loose mantle of soil grains. Remains of crab spiders (Thomisidae) were found in one of these nests.

Later in the summer of 1952 I secured another nest from a

¹ Linsley, E. G., MacSwain, J. W., and Ray F. Smith, 1952, The Bionomics of *Diadasia consociata* Timberlake and some biological relationships of Emphorine and Anthophorine bees, U. C. Pub. Ent., 9(3):267-290, plates 1-6.

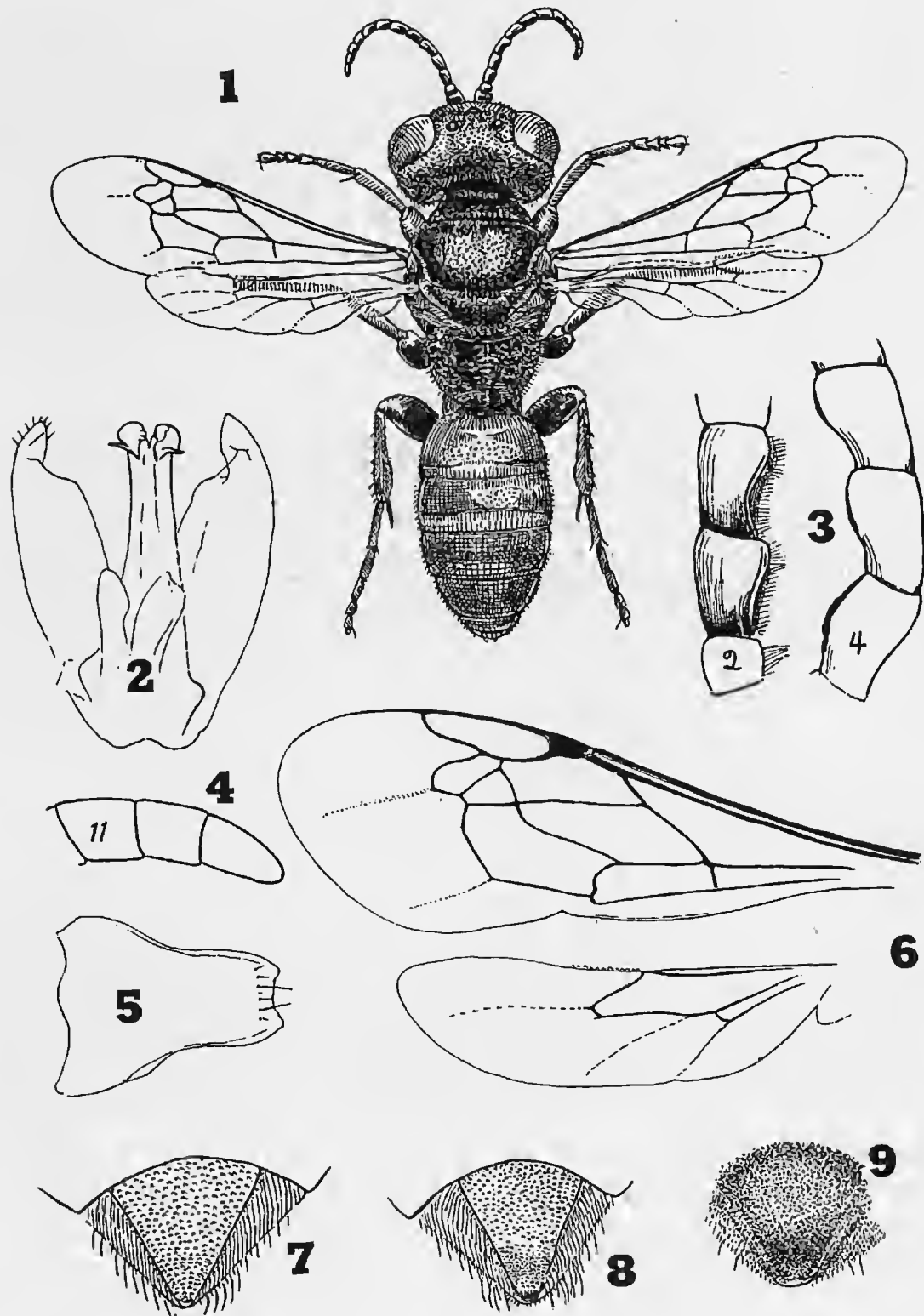


Fig. 1. *Pisonopsis clypeata* subspecies *occidentalis*. Male. Length 6.5 mm. From San Rafael, California. Fig. 2. Same. Male. Aedeagus. Fig. 3. Same. Male. Antennal segments 3 and 4 and 4-6. Fig. 5. Same. Male. Last visible ventral segment. Fig. 6. *Pisonopsis triangularis* subspecies *californica*. Male. Fig. 7. *Pisonopsis clypeata*. Female. Pygidium. Gold Lake, Mono County, California. Fig. 8. *Pisonopsis clypeata* subspecies *occidentalis*. Female. Pygidium. San Rafael, Marin County, California. Fig. 9. *Pisonopsis triangularis* subspecies *californica*. To show poorly defined pygidial area. Tassajara Hot Springs, Monterey County, California.

stem of a clump of oats, the stem was cut down to about four and one-half inches from the ground a few days previous. The upper cell was stoppered to the brim as well as separated from the second by considerable quantities of fine soil lumps. It contained 25 generally pallid thomisid spiders, the largest about 3 mm. long. On one of the innermost of these spiders a small wasp larva was feeding. A few days later both cells contained typical *Pisonopsis* casks. Still later in the summer other such nests were found under the same conditions.

During the summer of 1953, several individuals of *Pisonopsis birkmanni* were reared from cocoons found in dead stems of the white sage (*Salvia apiana* Jepson), collected at La Mesa, San Diego County, California.

KEY TO THE SPECIES OF NORTH AMERICAN PISONOPSIS

1. Antennae with 12 segments; abdomen with 6 tergites visible (females)2.
- Antennae with 13 segments; abdomen with 7 tergites visible (males)6
2. Pygidium well defined, margined by a carina; sculpture coarser; abdomen more or less red3
- Pygidium not or poorly defined, there being no bounding carina; sculpture finer; abdomen black or reddish4
3. Pygidium broader, forming an angle of about 58°-63° *clypeata* Fox
- Pygidium narrower, forming an angle of about 48°
.....*clypeata* Fox, subspecies *occidentalis* Williams
4. Disc of propodeum with a shining, nearly smooth slightly bossed area on each side of the transversely striated depression, the striae and some strong punctures somewhat invading this bossed area; on sternites 3, 4, and to a less extent on 5, is a pair of slit-like grooves that are best developed laterally, the lamellae nearly joining to form an angle along the middle line (fig. 27); pygidium not at all defined; pronotal lobes pale margined *birkmanni* Rohwer
- Disc of propodeum of a duller and more rugulose appearance, transversely striated over the depressed triangular area, and more finely so across the slightly bossed area on either side, and with no distinct strong punctures invading (fig. 31); sternites 3 and 4 with the grooves becoming weak or disappearing towards the middle line where they tend to form a lobe (fig. 28; pygidial area indicated by a slight dorsal flattening and sometimes by a slight latero-apical compression (fig. 9)5
5. Sternites 3 and 4 with the grooves extending mesad or nearly, as lines; abdomen often reddish *triangularis* Ashmead
- Sternites 3 and 4 with the grooves short, only lateral
.....*triangularis* Ashmead, subspecies *californica* Williams
6. Form stouter, punctures coarser; scutum and scutellum polished, with large separate punctures; abdomen reddish7

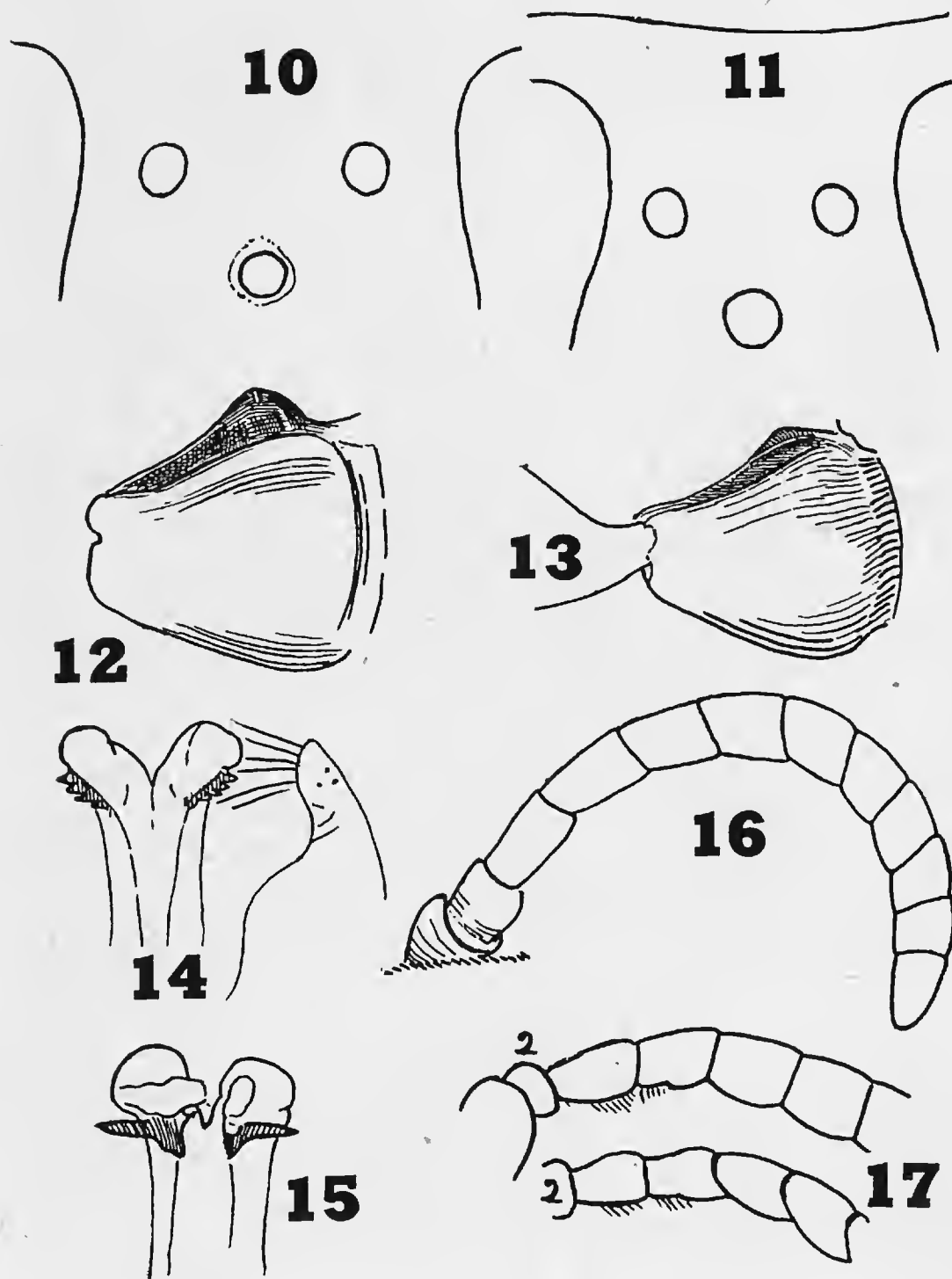


Fig. 10. *Pisonopsis clypeata* subspecies *occidentalis*. Male. Ocelli. Bryson. Monterey County, California. Fig. 11. *Pisonopsis triangularis* subspecies *californica*. Female. Monterey County, California.

Figure 12. *Pisonopsis clypeata*. Female. Posterior coxa, to show carinal lobe. Mono County, California. Fig. 13. *Pisonopsis triangularis* subspecies *californica*. Female. Posterior coxa, to show carinal lobe. Monterey County, California. Fig. 14. *Pisonopsis birkmanni*. Male. Extremity of aedeagus. Menlo Park, California. Fig. 15: *Pisonopsis clypeata*, subspecies *occidentalis*. Male. Extremity of aedeagus. Fig. 16. *Pisonopsis triangularis*, subspecies *californica*. Female. Monterey County, California. Fig. 17. *Pisonopsis triangularis* subspecies *californica*. Male. Antennae, two views. Lassen County, California.

- Form less stout; clypeus always triangularly produced; puncturation finer; scutum and scutellum with punctures on what appears to be in certain lights, a very finely reticulate surface; abdomen black or reddish8
- 7. Clypeus triangularly produced or with a gradation slightly indicated (fig. 30) *clypeata* Fox
- Clypeus truncate, with a median tooth (figs. 22, 23)
.....*clypeata* Fox, subspecies *occidentalis* Williams
- 8. Vertex, and dorsum of thorax with strong close punctures, the punctures behind the ocellar area often not or hardly their own diameter apart; disc of propodeum with the median striated area not much depressed, bordered laterad by a shining though more or less transversely striated area, with few strong punctures invading from the sides; no median carina; slit-like grooves on sternites 3 and 4 forming an angle mesad; pronotal lobes narrowly pale margined *birkmanni* Rohwer
- Vertex and dorsum usually with somewhat finer puncturation, the punctures behind the ocellar area often much more than their diameter apart; disc of propodeum with the median area well depressed and with a carina, the whole glabrous area obliquely and transversely striate; slit-like grooves on sternites 3 and 4 either rudimentary or uniting mesad as a rounded lobe; pronotal lobes entirely black9
- 9. The slit-like grooves on sternites 3 and 4 well developed; meeting or nearly meeting at the middle line to form a lobe; abdomen sometimes partly red *triangularis* Ashmead
- The slit-like grooves poorly developed, short and far laterad, present on sternite 3, or 3 and 4
.....*triangularis* Ashmead, subspecies *californica* Williams

PISONOPSIS CLYPEATA FOX

(Figures 7, 12, 19, 30, 32)

Fox, 1893, *Psyche*, 6:553-554. Male and female. Nevada (Morrison).

Female: Length 9 mm. Stout, rather coarsely sculptured, shining. Black; abdomen rufous. Clypeus drawn out wedge-like. Strong distinct punctures on head and dorsulum; disc of propodeum with a somewhat triangular enclosure, obliquely striate on basal portion, transversely so on apical portion. Pygidial area triangular, well margined and with strong punctures. Pile silvery.

Male: Length 7 mm. Much like the female, but segments 1-6 of the flagellum of the antennae produced beneath; the clypeus is produced wedge-like but with an indication of gradation (fig. 30). Pygidium densely though rather irregularly rugulose punctate; last visible ventral segment rather broadly excavate. Pile silvery.

Through the kindness of Mr. J. A. G. Rehn, of the Academy of Natural Sciences of Philadelphia, I was able to study a male and a female of the type series. I have also seen a single female from Gold Lake, Sierra County, California, collected August 2, 1921, by C. L. Fox (California Academy of Sciences). The pygidium

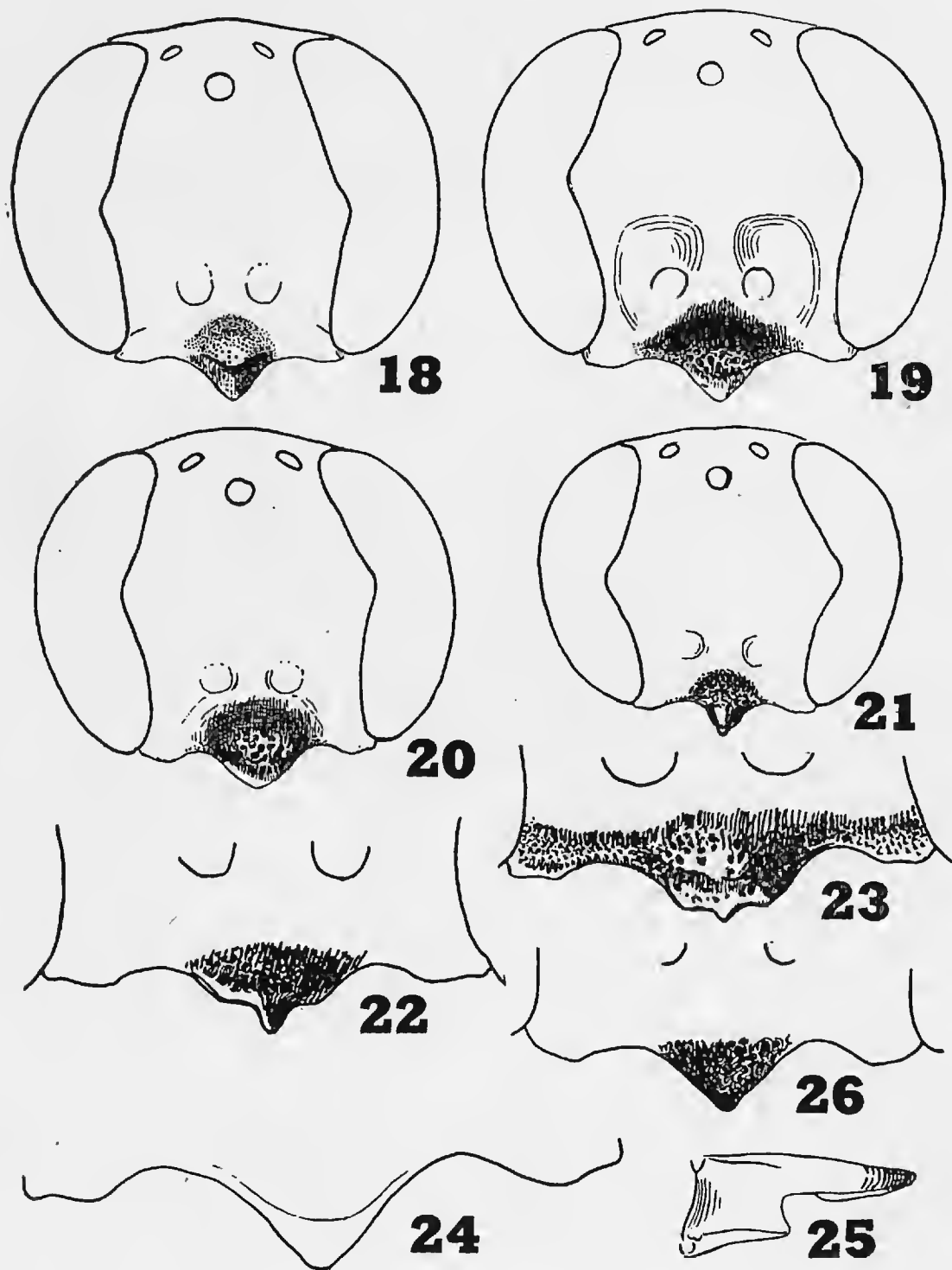


Fig. 18. *Pisonopsis triangularis* subspecies *californica*. Female. Monterey County, California. Fig. 19. *Pisonopsis clypeata*. Female. Mono County, California. Fig. 20. *Pisonopsis clypeata*, subspecies *occidentalis*. Female. San Rafael, California. Fig. 21. *Pisonopsis birkmanni*. Female. San Matco, County, California. Fig. 22. *Pisonopsis clypeata*, subspecies *occidentalis*. Male. San Rafael, California. Fig. 23. Same. Male. Bryson, Monterey County, California. Fig. 24. *Pisonopsis triangularis*, subspecies *californica*. Female. Clypeal outline. Mt. Lassen, California. Fig. 25. Same. Female. Mandible, outer side. Fig. 26. *Pisonopsis clypeata*, subspecies *occidentalis*. Female. Clypeus unworn. Near Palm Springs, California.

and head are shown (figs 7 and 19, respectively); this specimen, however, has the pygidium narrower than in the type (fig. 32), and thus approaching that of its subspecies (fig. 8).

***Pisonopsis clypeata occidentalis* Williams, new subspecies**

(Figures 1-5, 8, 10, 15, 20, 22, 23, 26, 29)

Female, holotype: Length 7.75 mm. Black, moderately shining, strongly punctate and sculptured, the two basal joints of the antennae in part, and the apical half of the mandibles reddish brown, hind margin of pronotal lobes whitish, tegulae, axillary sclerites and base of wings more or less brownish, abdomen orange red, the somewhat apical margin of the segments testaceous. Clypeus produced subconic, the disc subconvex, not carinate, with coarse punctures before the smooth depressed apical portion; antennae rather slender, segments 3 and 4 subequal; frons very densely punctate-granulate; vertex with strong close punctures; interocular space at vertex about .70 of its narrowest width at clypeus and about equalling antennal segments 2 plus 3 plus 4; ocelli forming nearly a right angle triangle; a depressed line from anterior ocellus to about abreast of the ocular emargination. Scutum, mesopleura and scutellum with strong separate punctures; postscutellum fine, very close ones; propodeum with an inbowed triangular depression with a median carina and well-spaced oblique and transverse carinulae, the rounded ridges laterad transversely striate; laterad of these ridges granulate, the pleura with strong horizontal striae, the posterior face striato-granulate and with a median groove. Posterior coxae with a rounded ridge on inner side above near base. Second submarginal cell receiving both recurrent veins. Abdomen with strong separate punctures; pygidium with the lateral carinae sharp, the disc with fine close punctures and somewhat depressed and constricted beyond middle length. Vestiture rather sparse silvery pile.

Male, allotype: Length 7 mm. In general resembling the female, but the apical half of the abdomen, except for the testaceous margin of the segments, is blackish. The clypeus is subtruncate, with a median tooth, its disc closely punctate; antennae with segments 3-6 nearly equal, segments 3 and 4 excavate beneath and somewhat inwardly at base and there polished and with fine erect pile; segments 4-9 beneath and somewhat outwardly, produced so as to give that section a more or less spirally crenulate appearance. Interocular space at vertex relatively broad, about .80 of the space near the clypeus and slightly greater than antennal segments 2 plus 3 plus 4. Pygidial area flat, not margined, densely punctate.

Holotype female and *allotype* male (California Academy of Sciences): SAN RAFAEL, MARIN COUNTY, CALIFORNIA, July, 1922 (F. X. Williams), on ground among dry leaves at edge of thicket. Paratypes: 1 female and 10 males, San Rafael and nearby, July 16 and 22, 1922 (F. X. Williams); 1 male, Bryson, Monterey County, California, May 18, 1920 (E. P. Van Duzee) (Collection California Academy of Sciences); 1 female near Palm Springs, Riverside County, June 8, 1930 (P. H. Timberlake), on *Eriogonum*

trichopodum; other specimens: 11 females and 22 males, Tracy, San Joaquin County, end of May, in June, and August 1, 1949 (J. W. MacSwain, R. F. Smith and P. D. Hurd) ; 1 male, Tanbark

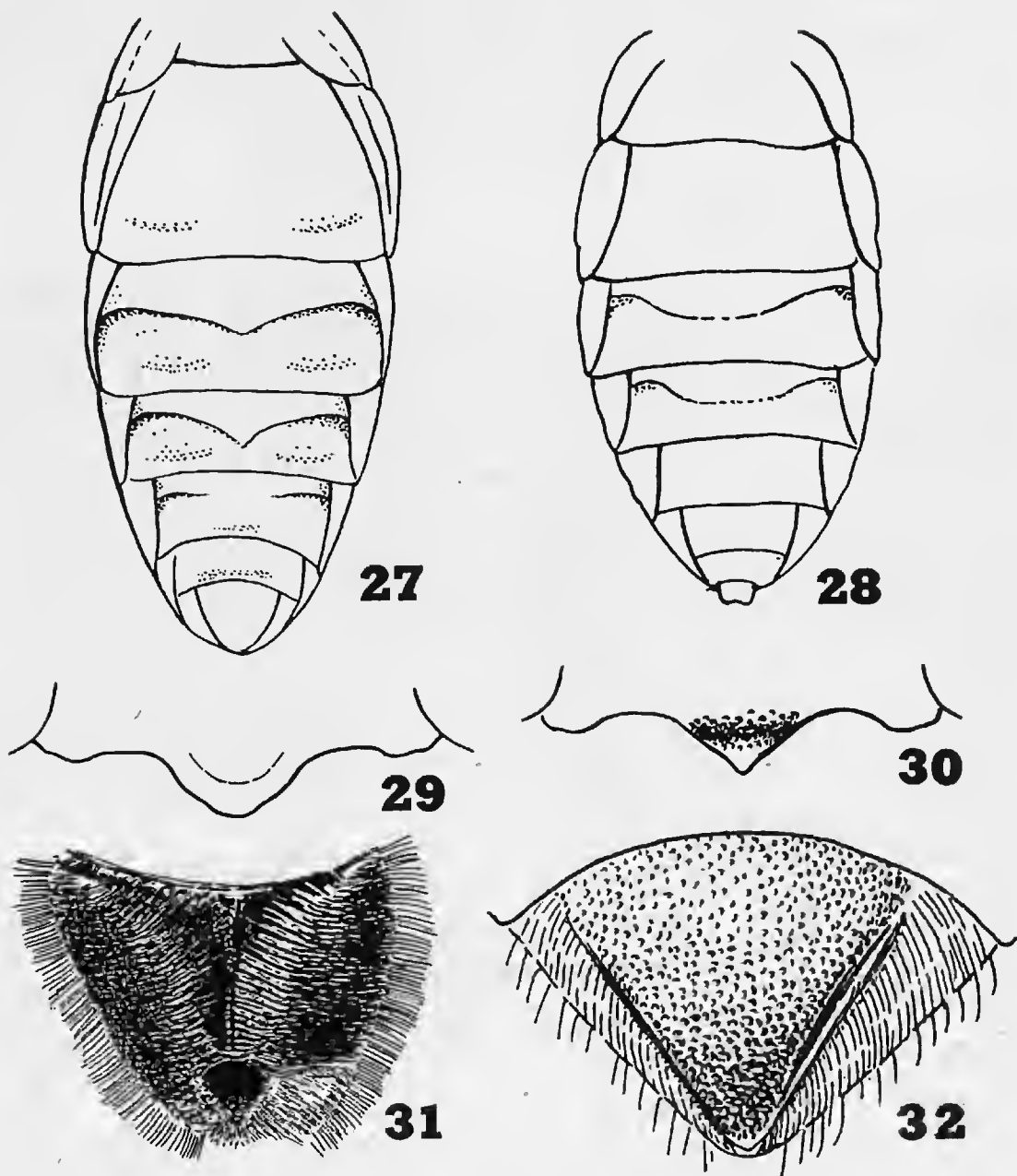


Fig. 27, *Pisonopsis birkmanni*. Male. To show grooves on sternites 3-5. Williamson County, Texas. Fig. 28. *Pisonopsis triangularis*. Male. To show grooves on sternites 3 and 4. Green River, Wyoming. Fig. 29. *Pisonopsis clypeata*, subspecies *occidentalis*. Female, Clypeus, unworn but not the usual type. Tracy, California. Fig. 30. *Pisonopsis clypeata*. Male. Allotype. Clypeus. Nevada. Fig. 31. *Pisonopsis triangularis*, subspecies *californica*. Female type. Disc of propodeum. Summit Lake, Mt. Lassen, California. Fig. 32. *Pisonopsis clypeata*, Paratype female. Pygidium. Nevada.

Flat, San Gabriel Mountains, California, June 25, 1950 (F. X. Williams).

This subspecies differs from typical *P. clypeata* Fox by the narrower pygidium of the female, and by the distinctly truncate and toothed clypeus (with slight variations) in the male.

The female paratype and all the males have the apex of the abdomen blackish.

PISONOPSIS BIRKMANNI Rohwer

(Figures 14, 21, 27)

Rohwer, 1909, Trans. Amer. Ent. Soc., 35:129. Female. Lee County, Texas, (Birkmann).

Descriptions based on California specimens: *Female*: Length 6 mm. Black; head and thorax subopaque, disc of propodeum with a shining area each side of the median sulcation; mandibles reddish on apical half, pronotal lobes white to pale brownish apically. Clypeus with the convex basal part coarsely punctate, particularly at the origin of the smooth produced median portion which forms a wedge which is slightly shouldered not far from the apex; antennae short, segment 4 slightly longer than 3; front and vertex opaque, finely reticulate and granulate-punctate; ocelli forming a right angle triangle; interocular space at vertex little if any narrower than at clypeus. Dorsulum appearing reticulate and with rather fine strong punctures, sparser on scutellum. Disc of propodeum with an inbowed, somewhat triangular depressed area, its median carina not strong, the fine oblique carinulae becoming transverse at apex of disc; a finely reticulate shining strip on either side on disc, with strong, well-separated punctures invading from the striato-punctate area of most of the pleura and posterior face; the posterior face has on inverted, narrowly tear-shaped trench; posterior coxae with a rounded basal lobe. Abdomen with strong punctures, finer on apical segments, the apical margin of the sternites more or less testaceous; pygidium not margined, the area finely and closely punctate; sternites more finely punctate; pile silvery.

Male: Length 5.25 mm. About like the female. Clypeal tooth acute; antennal segments 3 and 4 subventrally excavate at base, this area brown and shining, while dorsally there is some fine erect pile; antennal segment 5 somewhat longer than 4, segments 4-9 outwardly convex so as to give that section a somewhat crenulate effect. Disc of propodeum with the transverse carinulae more extensively invading the nearly smooth area on either side; median carina, obsolescent. First recurrent vein received at tip of first submarginal cell.

One female and 2 males, Menlo Park, San Mateo County, California, July 1937 (F. X. Williams); 1 male, Searsville Lake, San Mateto County, June 29, 1937 (F. X. Williams); 6 females and 3 males, Danville, and 1 female, Mt. Diablo, Contra Costa County, California, June-August, 1949 (F. X. Williams); 2 males, Tanbark Flat, San Gabriel Mts., California, July 8, 1950 (F. X. Williams); 2 males and 2 females, La Mesa, San Diego County, Summer of 1953 (F. X. Williams); 1 male and 1 female, Davis, Yolo County,

California, August 24, 1939 (G. E. Bohart); 1 female, Box Canyon, Riverside County, California, April 13, 1934, on *Chilopsidis linearis* (Orobanchaceae), (P. H. Timberlake); 2 females and 1 male, Riverside, September 21, 24, 26, 1948, "feeding at exudations of *Opuntia* plants" (P. W. Weber). Other specimens seen: From the United States National Museum and the Krombein collection, 1 female, Brazos County, Texas, July 25, 1937 (J. E. Gillaspay), "on corn," (Dr. Krombein kindly compared this specimen with the type); 1 male, Williamson County, Texas, April 23, 1935 (J. E. Gillaspay); 1 female, La Crescenta, Los Angeles County, California (R. M. and G. E. Bohart), this last specimen not being typical.

This species varies somewhat in sculpture and venation.

PISONOPSIS TRIANGULARIS Ashmead

Ashmead, 1899, Ent. News, 10:9. Female. "Hab. Colorado. Carl C. Baker Collection, No. 2061. Type, No. 5064, U.S.N.M."

The type is 6 mm. long, rather opaque, and closely punctate. The clypeus has a median triangular production, and the disc of the propodeum is transversely striate, and rugulose. The sinuate slit-like grooves on sternites 3 and 4 extend nearly or quite to the median line to form a rounded lobe. The male much resembles the female; the clypeus has a smooth acuminate point, while the antennal modifications resemble those of its subspecies, *Pisonopsis triangularis californica* (fig. 17) that follows. Figure 28 is from a male specimen from Green River, Wyoming (4747:American Museum of Natural History). Other specimens are: 1 male, Tracy, San Joaquin County, California, May 31, 1949 (J. W. MacSwain); 1 female and 6 males, Tanbark Flat, San Gabriel Mountains, California, 2700 ft., end of June to early July, 1950 (F. X. Williams). The California specimens have the abdomen largely reddish.

Pisonopsis triangularis californica Williams, new species

(Figures 6, 9, 11, 13, 16, 17, 18, 24, 31)

Female, holotype; length 6.75 mm. Black, moderately shining, frons subopaque; puncturation fine and close; mandibles reddish, subapically; depressed apices of tergites in part testaceous; calcariae brownish to black. Clypeus with the anterior part of the convex disc with rather large, well-spaced punctures, the triangular projection smooth; frons finely and closely punctate; antennal segments 3 and 4 subequal; interocular space at vertex less than at clypeus; ocelli in less than a right-angle triangle. Dorsum finely and closely punctate; scutum with a shallow median groove. Disc of propodeum shining, the depressed triangular area inbowed, the slope of the depression gradual, the oblique carinulae well spaced, fanning at base and becoming transverse and more crowded towards the apex, these carinulae breaking up towards the pile, the pleura are striato-punctate and the posterior face rugulose and with a smooth subtriangular fovea. Second recurrent vein barely within the second submarginal cell. Abdomen with fine piliferous punctures;

pygidial area feebly indicated by a dorsal flattening and slightly compressed apical sides; sternites 3 and 4 with the slit-like pockets lateral only, indicated by a fine curved linear groove.

Male, allotype: Length 5.5 mm. Resembling the female in most points. The clypeus is more sharply pointed, and the rather stout antennae (somewhat less modified than in *Pisonopsis birkmanni*) have segments 3 particularly, and 4 smooth and constricted for nearly the basal half, with segment 4 notched dorso-laterad, and segments 5 to 8 in a diminishing degree outwardly rounded beneath.

Holotype female, *allotype* male, one female and 1 male paratype, SUMMIT LAKE, LASSEN COUNTY, CALIFORNIA, 6700 ft., July 21, 1937 (F. X. Williams). In good condition. Other paratypes: 1 female, Tassajara Hot Springs, Monterey County, California, May 18, 1920 (L. S. Slevin) (C.A.S.); 1 female, Mammoth Lake, Mono County, California, July 25, 1936 (R. M. & G. E. Bohart), these two specimens having the abdomen somewhat reddish.

This rather weak and variable subspecies differs from *Pisonopsis triangularis* chiefly in the less developed grooves on sternites 3 and 4, and sometimes in its more closely aligned carinulae in the somewhat less sharply depressed propodeal enclosure.

I am indebted to Dr. Karl V. Krombein for comparing a female topotype of this subspecies with the type of *Pisonopsis triangularis* in the United States National Museum.

BOOK NOTICE

THE TAXONOMY, PHASES, AND DISTRIBUTION OF THE GENERA CHORTOICETES BRUNN. AND AUSTROICETES UV. (Orthoptera: Acrididae). By K. H. L. Key. 237 pp., 40 figs., 45 tables. Offset. Division of Entomology, Commonwealth Scientific and Industrial Research Organization, Australia. Canberra, May 1954. (Order from C. S. & I. R. Organization, 314 Albert St., East Melbourne, C.2.)

The genera *Chortoicetes* and *Austroicetes* include the chief injurious Acrididae of southern Australia. This paper is a detailed taxonomic study of the adult grasshoppers, based on very large series, with the results of many years of field work to aid in interpreting the tremendous infraspecific variation. Much of the resulting data are given statistical treatment. Three new species are described, and Latinized names proposed for 11 new forms (homologous-genetic variations). ". . . subspecies are recognized only where the population of a significant geographical region is homogeneous for a particular character or character complex, which serves to differentiate every member of that population from the members of other populations similarly homogeneous for some other character or character complex. The question is discussed in greater detail in Section III 2 (d)." —HUGH B. LEECH